

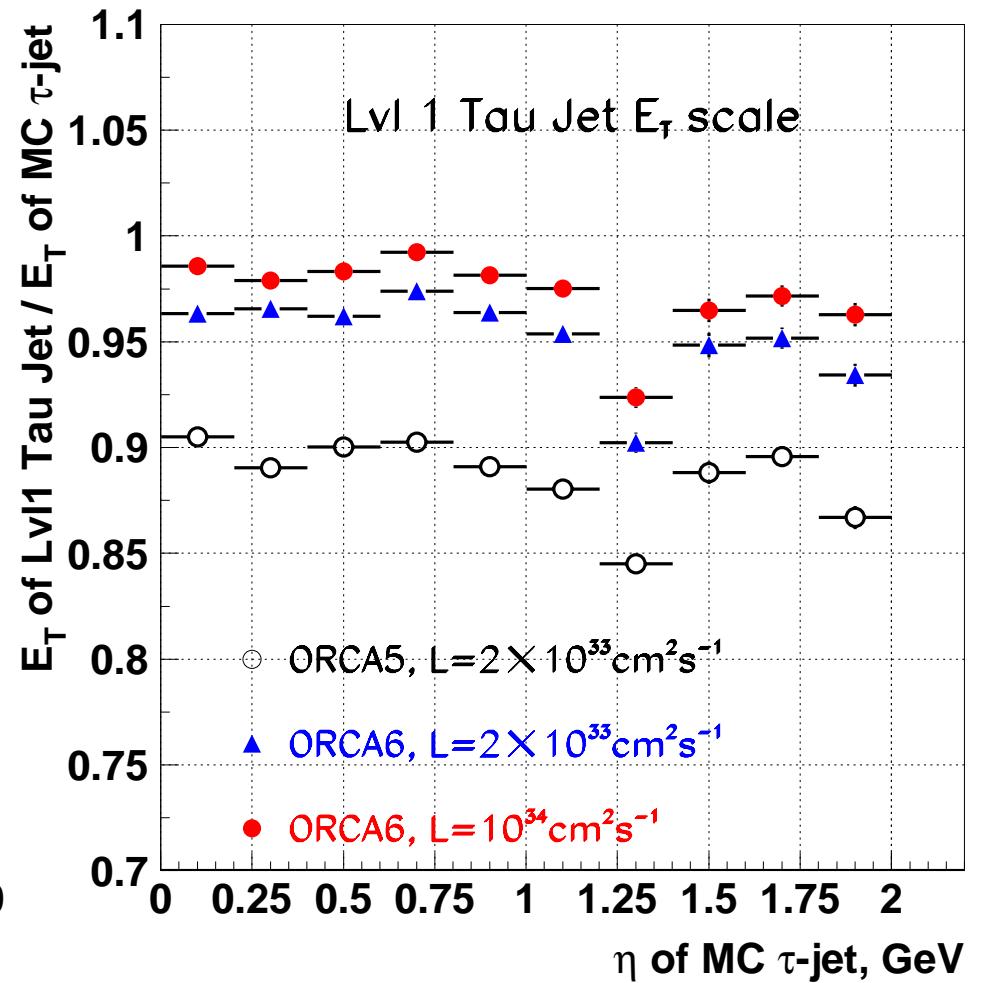
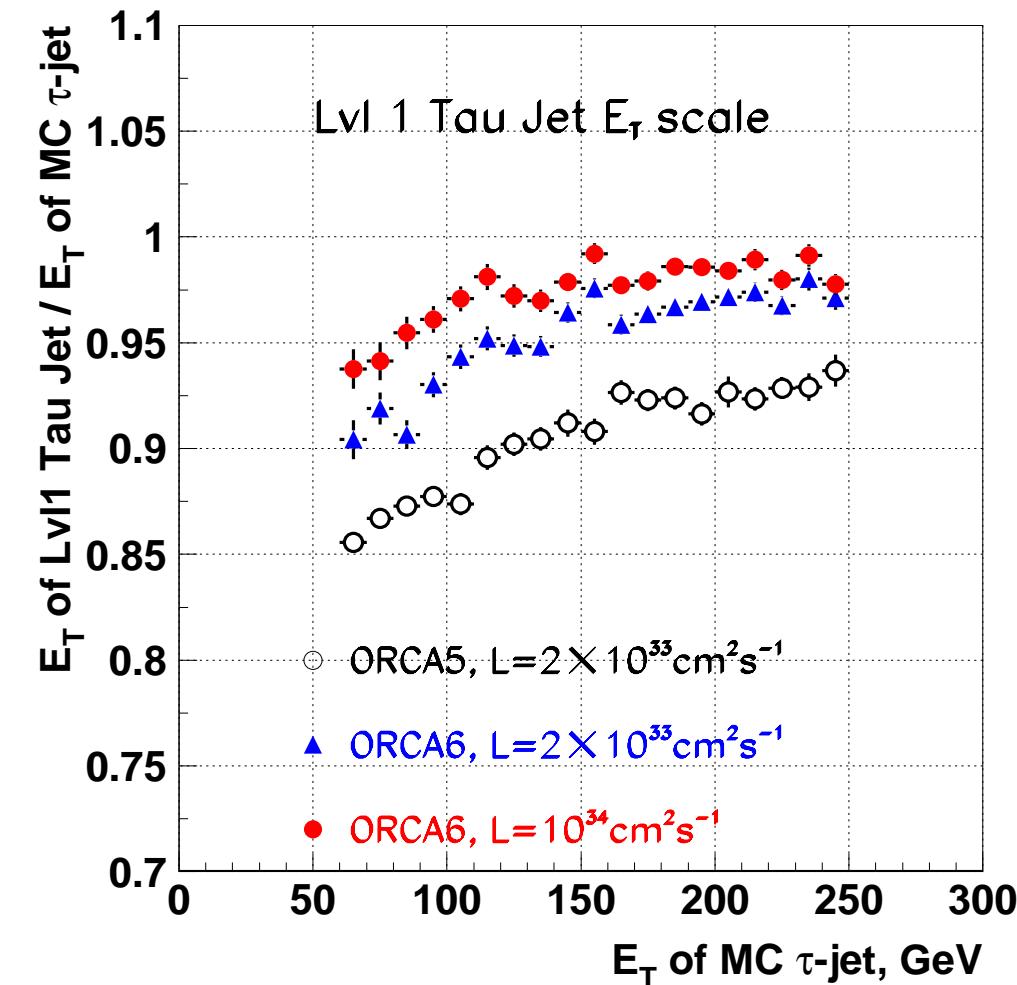
Taus with ORCA6

first results and comparison with ORCA5
on
Lvl-1 and HLT (Lvl-2 Calo and Pxl)

ORCA6 data analysed :

$H(500 \text{ GeV}) \rightarrow 2\tau\text{-jets, low/high lumi. } 10\,000 \text{ ev}$
 $qcd \, 50\text{-}80 \text{ GeV, high lumi, } 150\,000 \text{ ev.}$

L1 Tau Jet scale vs $E_T^{\tau\text{-jet}}$ and $\eta^{\tau\text{-jet}}$



Scale is changed by 5-10 %, but anyway L1 uses qcd jet scale
(see Andrei talk on calibration)

L1 Tau id

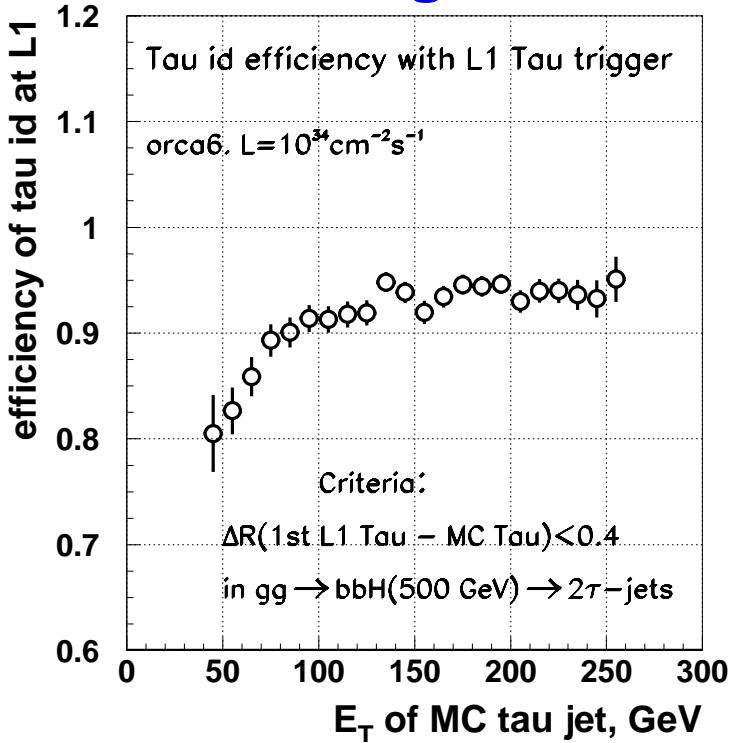
vs

$E_T \tau\text{-jet}$

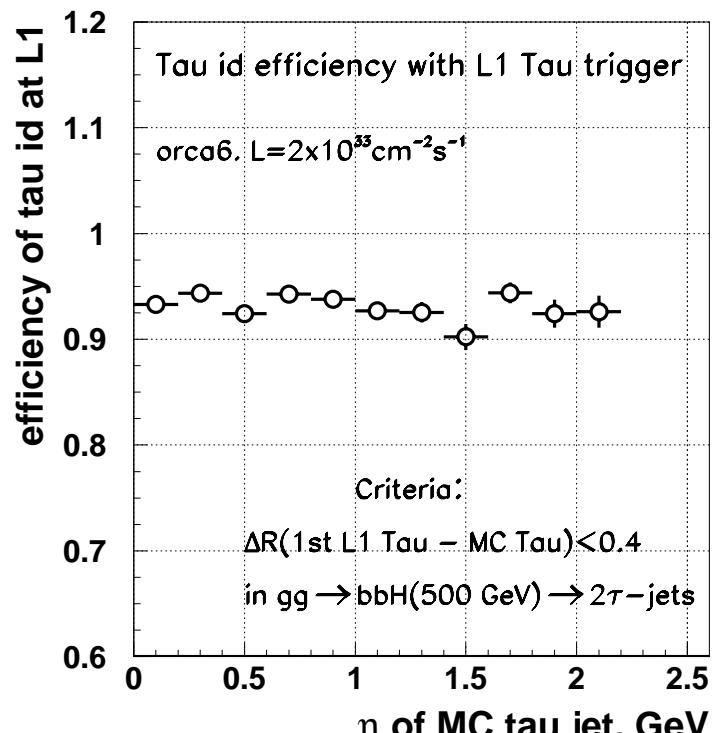
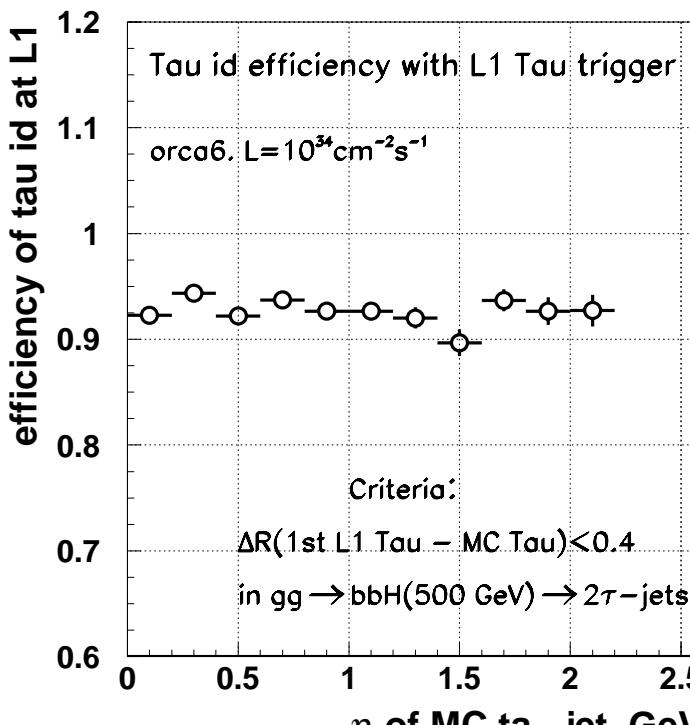
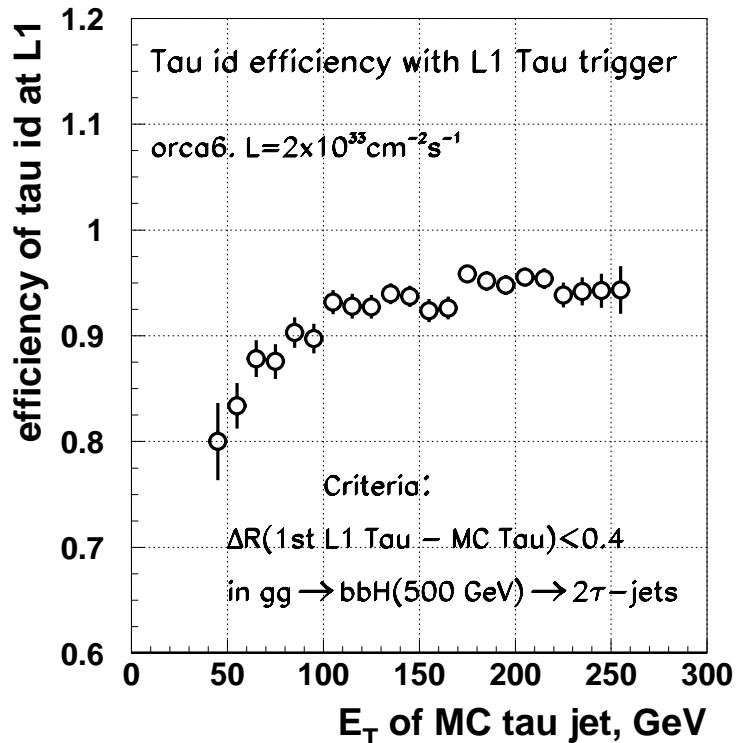
$\eta \tau\text{-jet}$

Similar to
ORCA5
OK !

orca6, high lumi

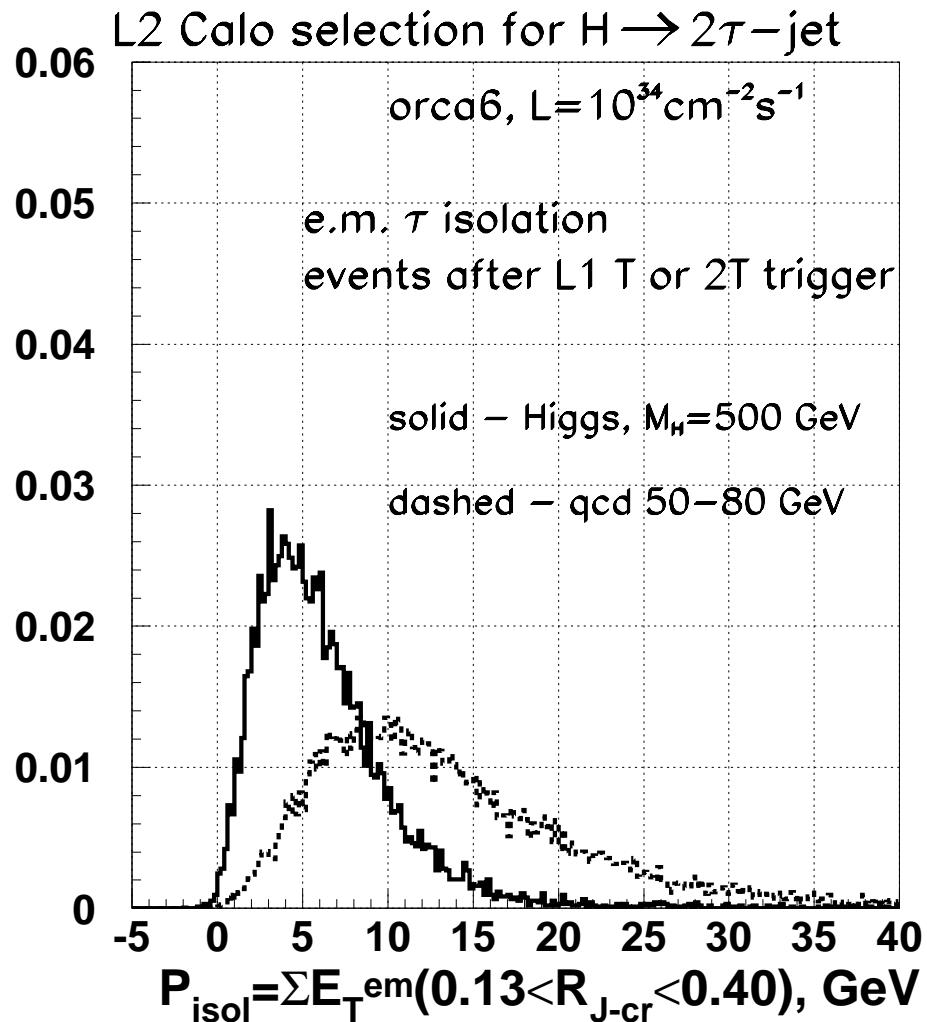


orca6, low lumi

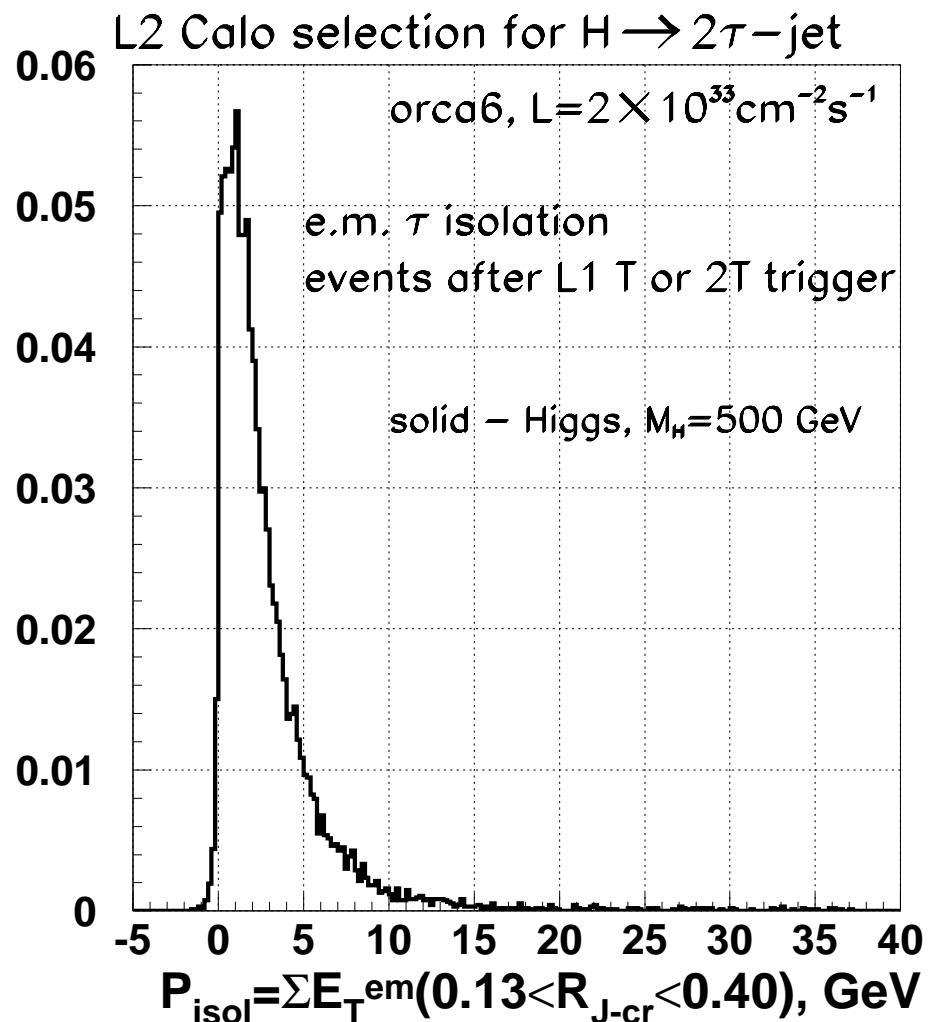


L2 Calo Tau id with e.m. isolation (I)

orca6. high lumi



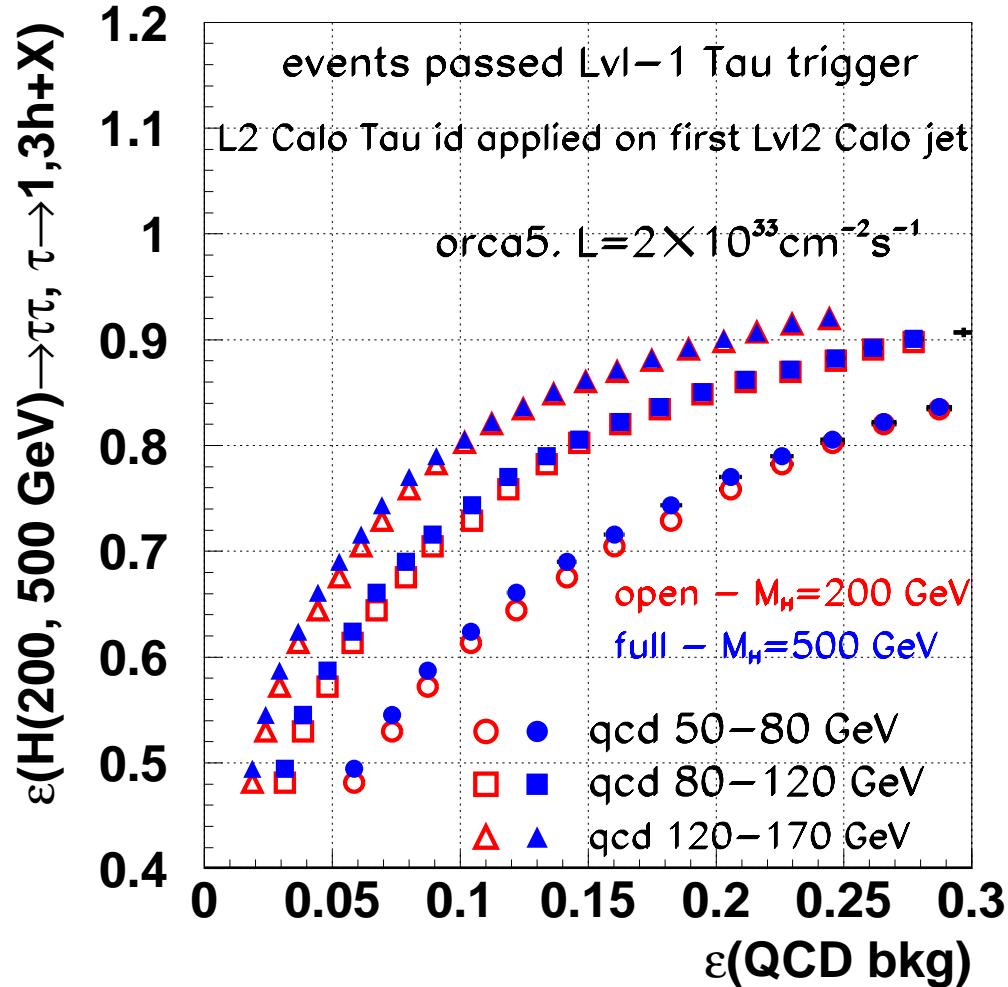
orca6. low lumi



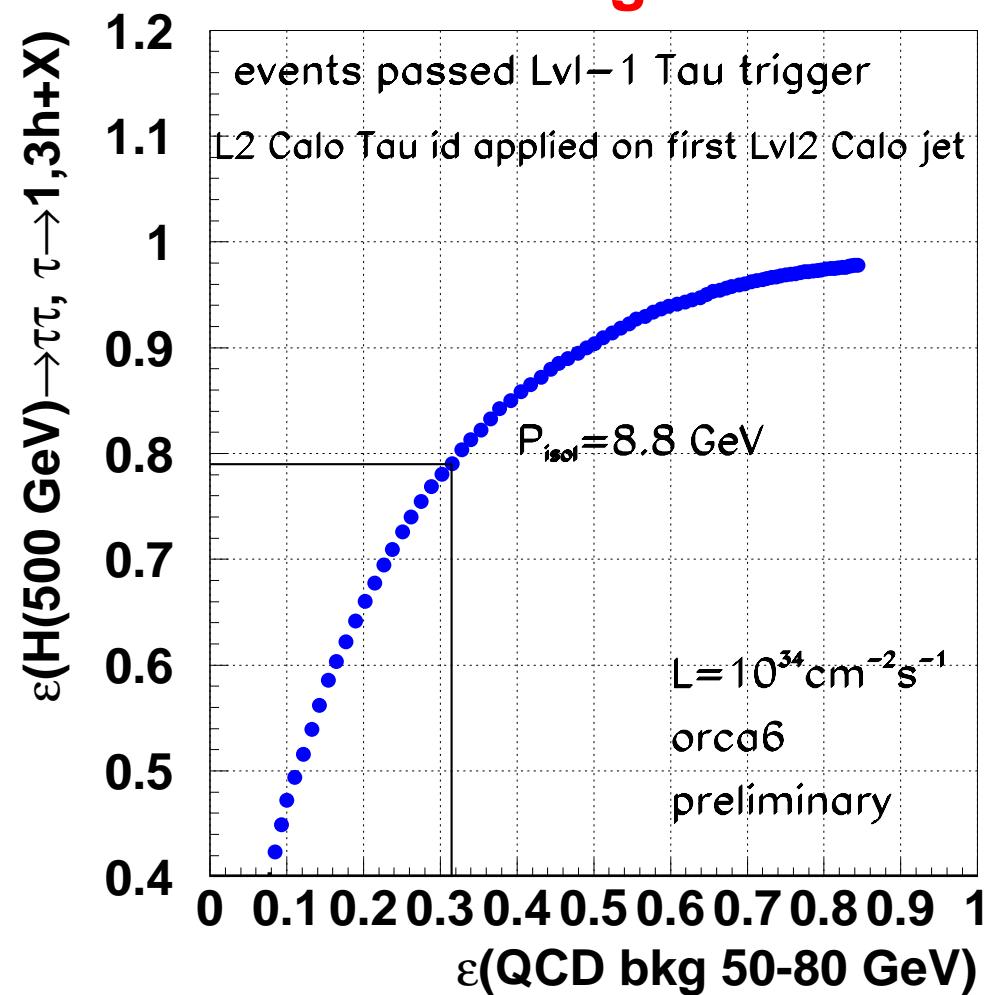
negative values of P_{isol} appeared due to ECAL sel. readout

L2 Calo Tau id with e.m. isolation (II) signal vs qcd bkg.

orca5. low lumi



orca6. high lumi



for signal eff = 0.80, bkg 50-80 GeV eff = 0.25 for orca5, low lumi
 eff = 0.30 for orca6, high lumi

performance in orca6 is similar to one in orca5

L2 CaloTau id

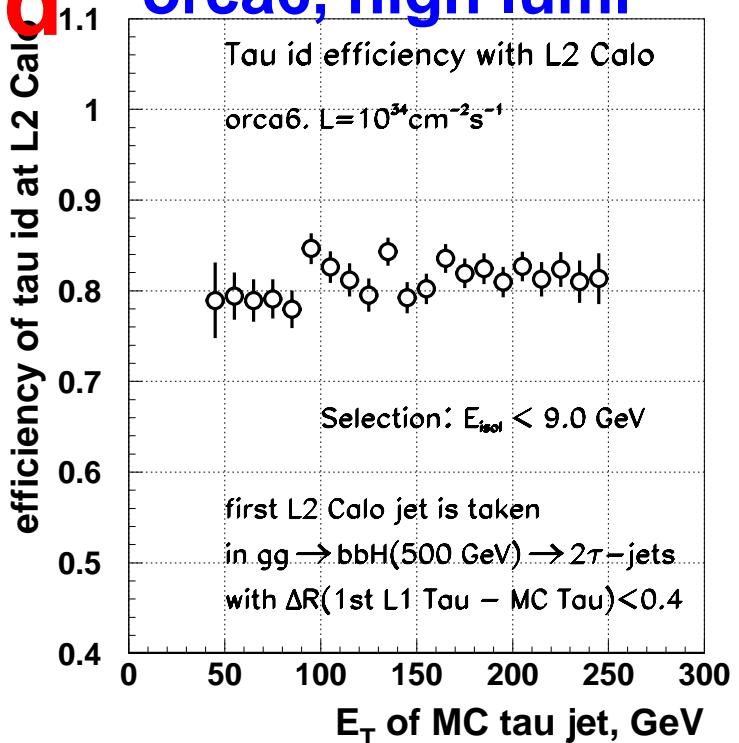
vs

$E_T \tau\text{-jet}$

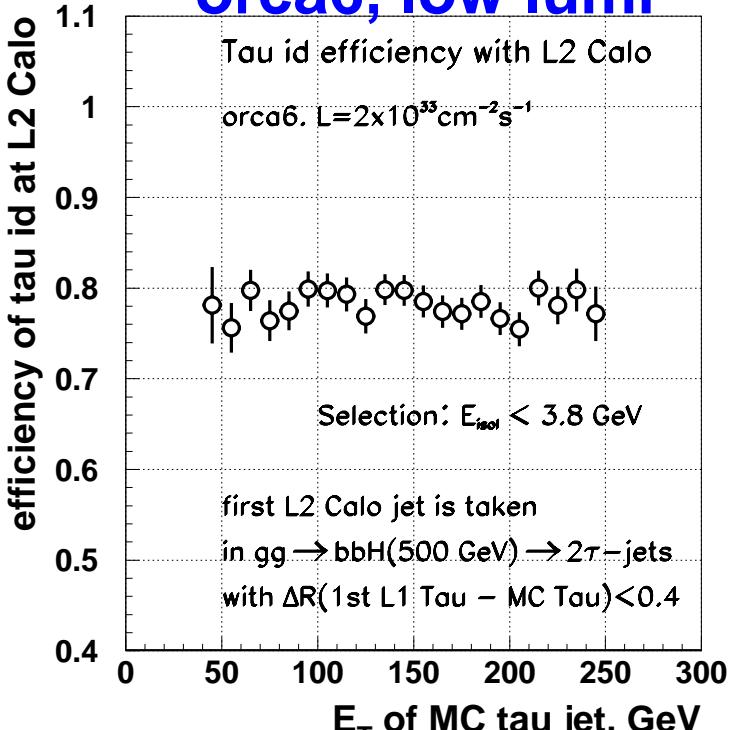
$\eta \tau\text{-jet}$

Similar to
ORCA5
OK !

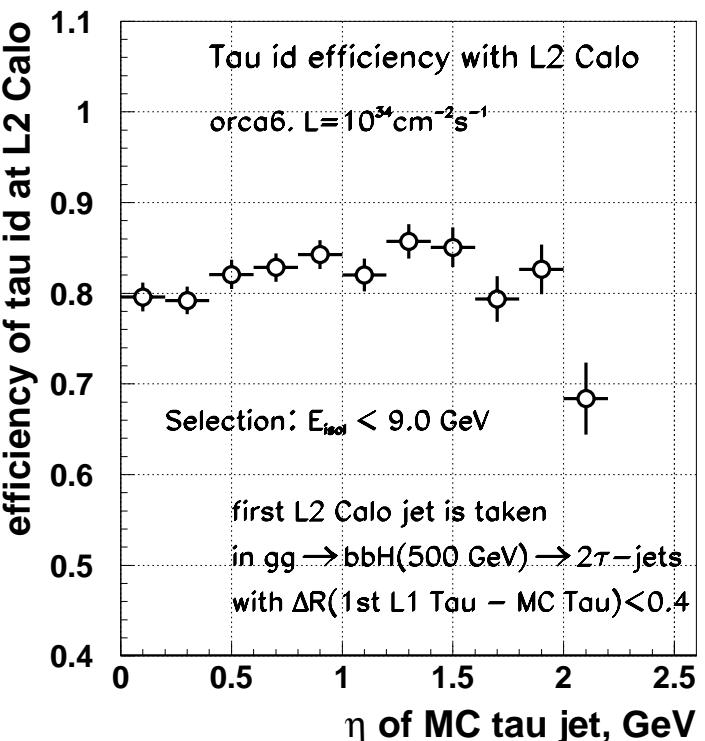
orca6, high lumi



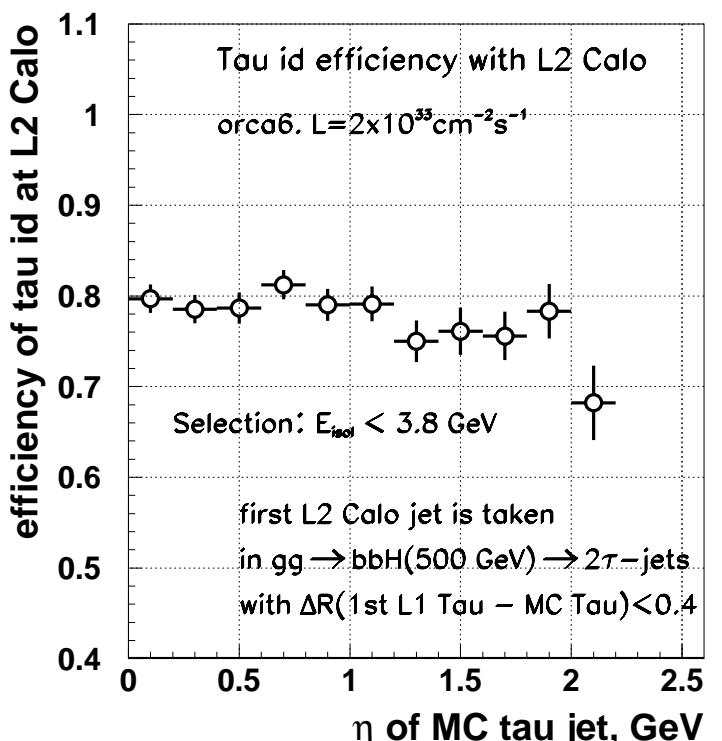
orca6, low lumi



Tau id efficiency with L2 Calo

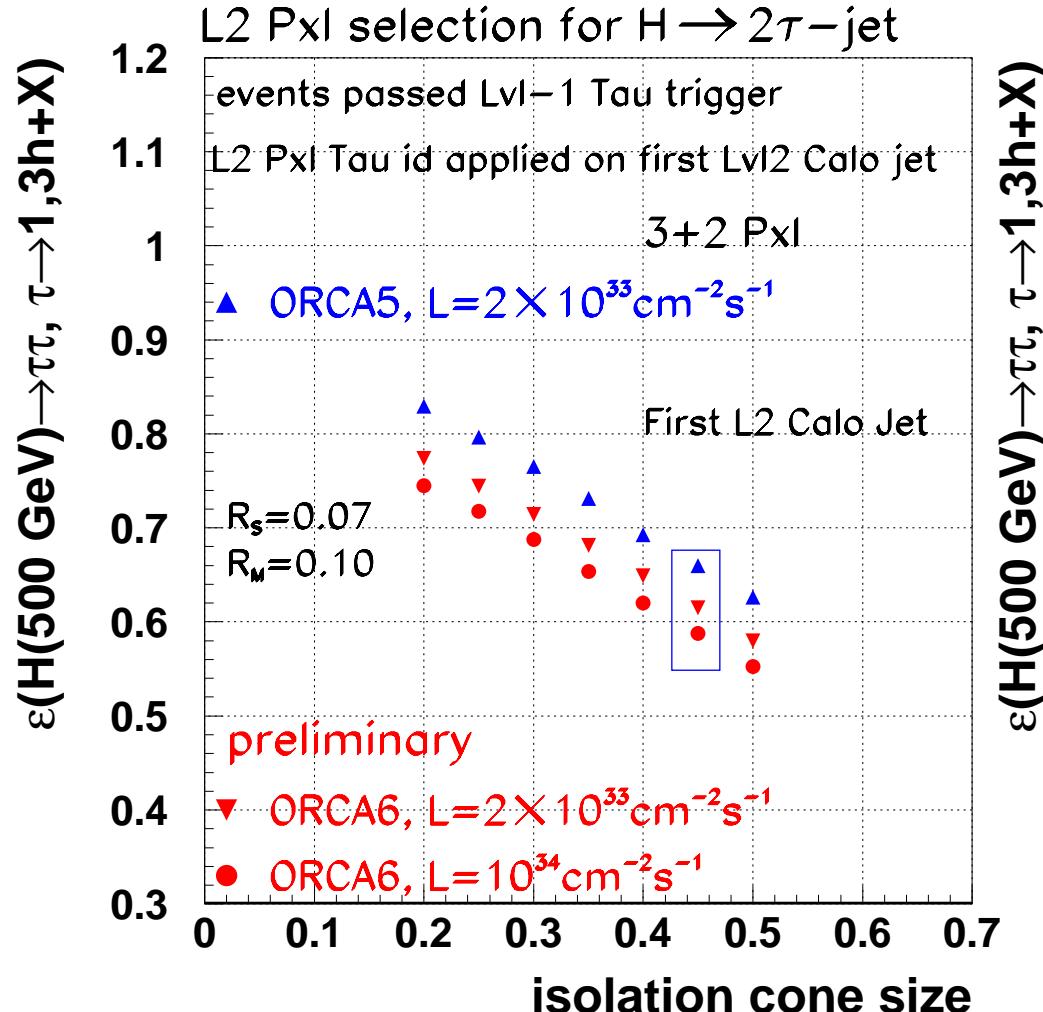


Tau id efficiency with L2 Calo

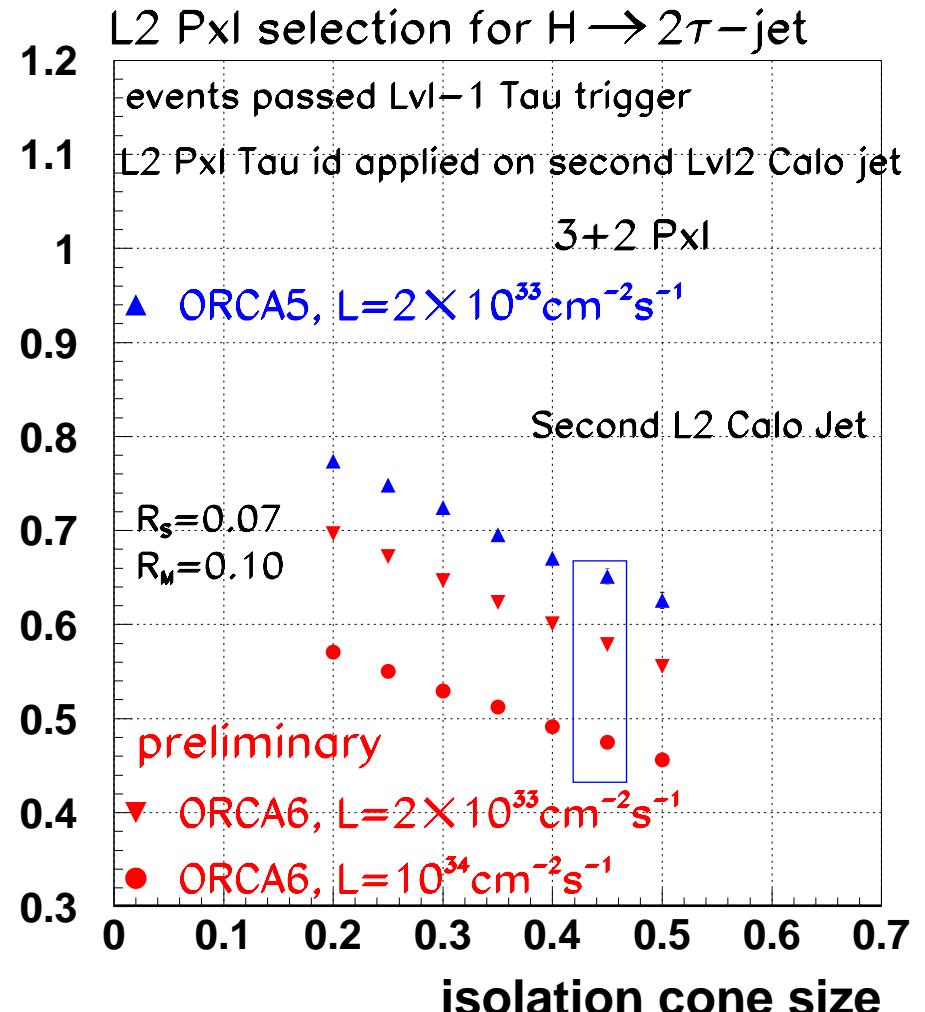


L2 Pxl Tau id isolation. Signal

first jet



second jet

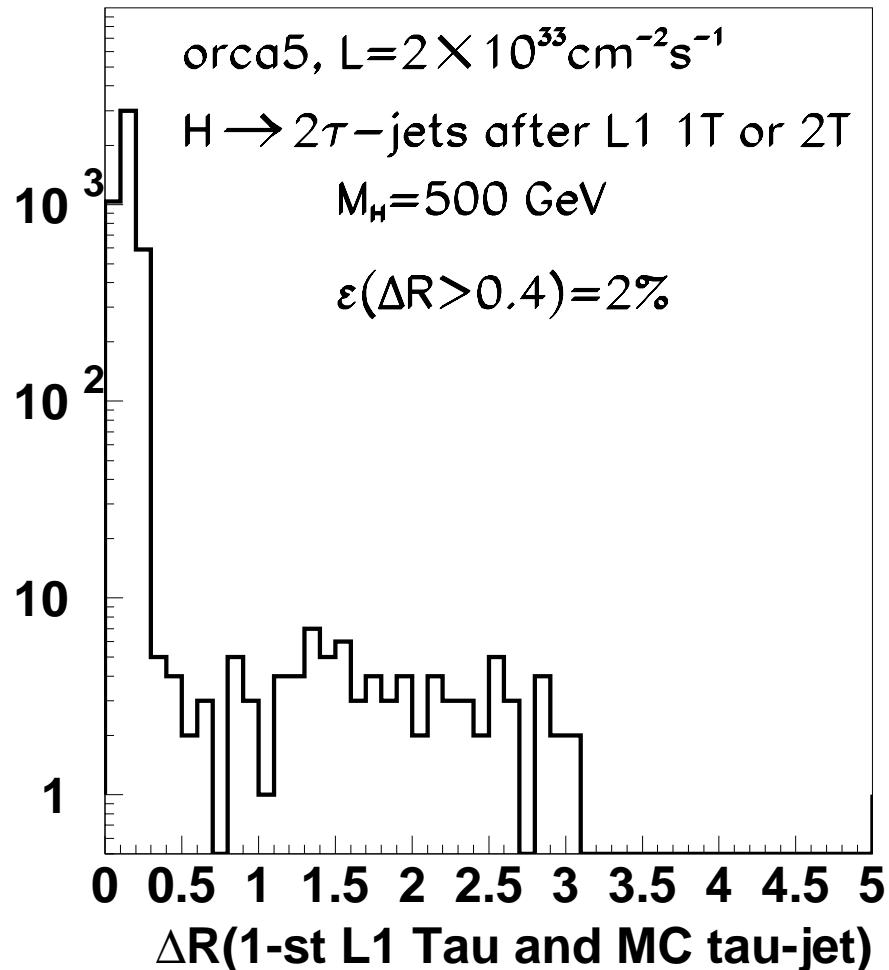


first jet is OK, small drop in efficiency due to more pxi. ineff. put in orca6 and more gaps in z in pxi. detector

second jet is OK for low lumi. why it's so bad for high lumi ? it's due to way of finding 2-nd jet at Lvl-2. see next slides.

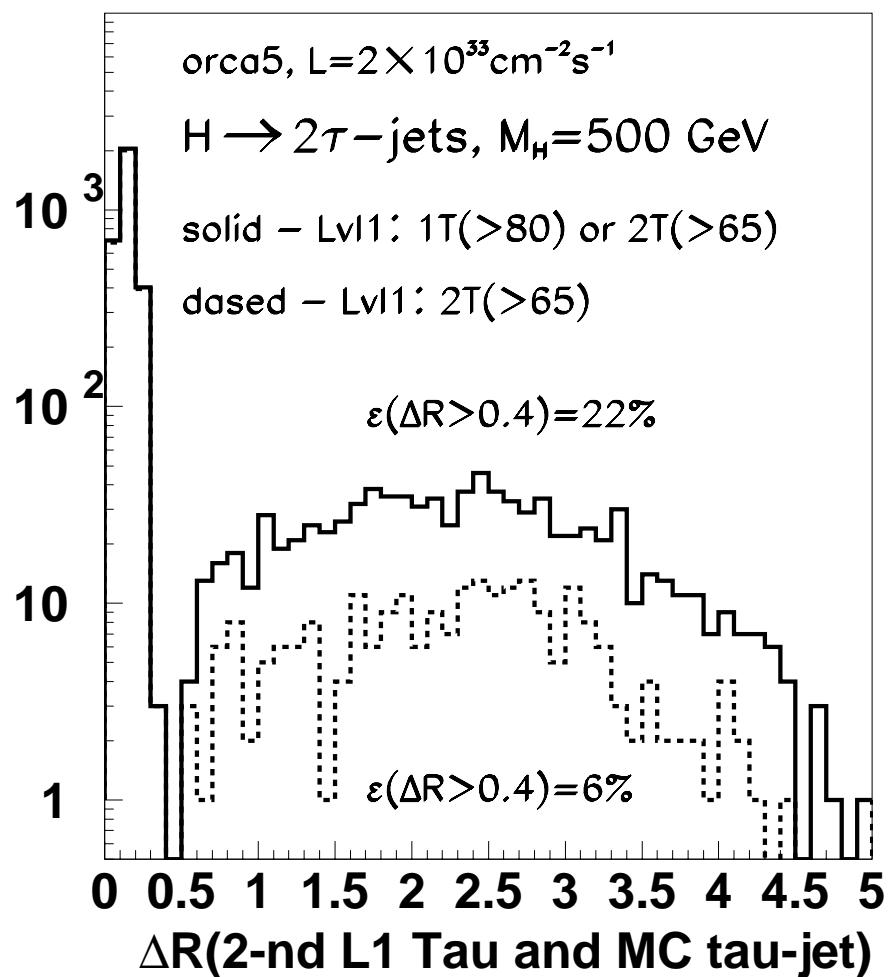
reminder : problem with 2-nd Lvl-2 jet (orca5) and how it was solved

matching of MC tau with
1-st L1 Tau Jet



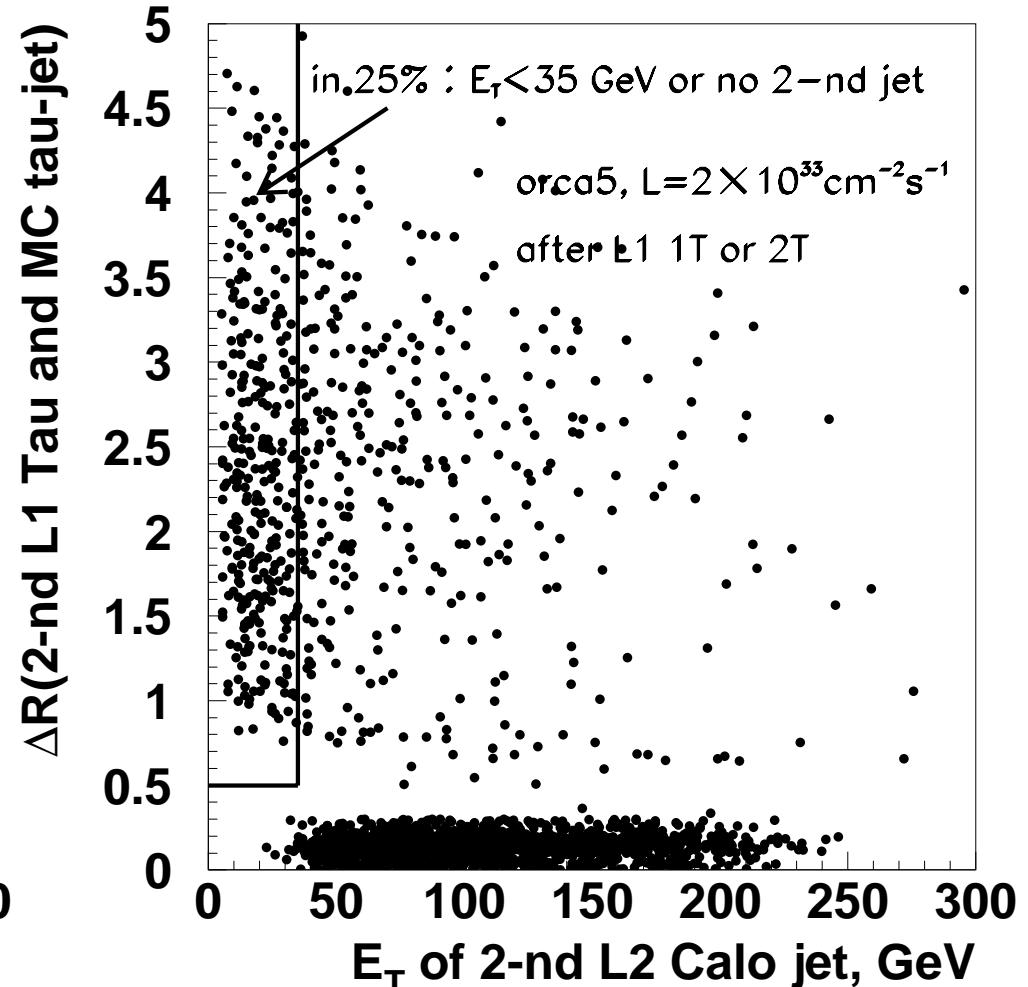
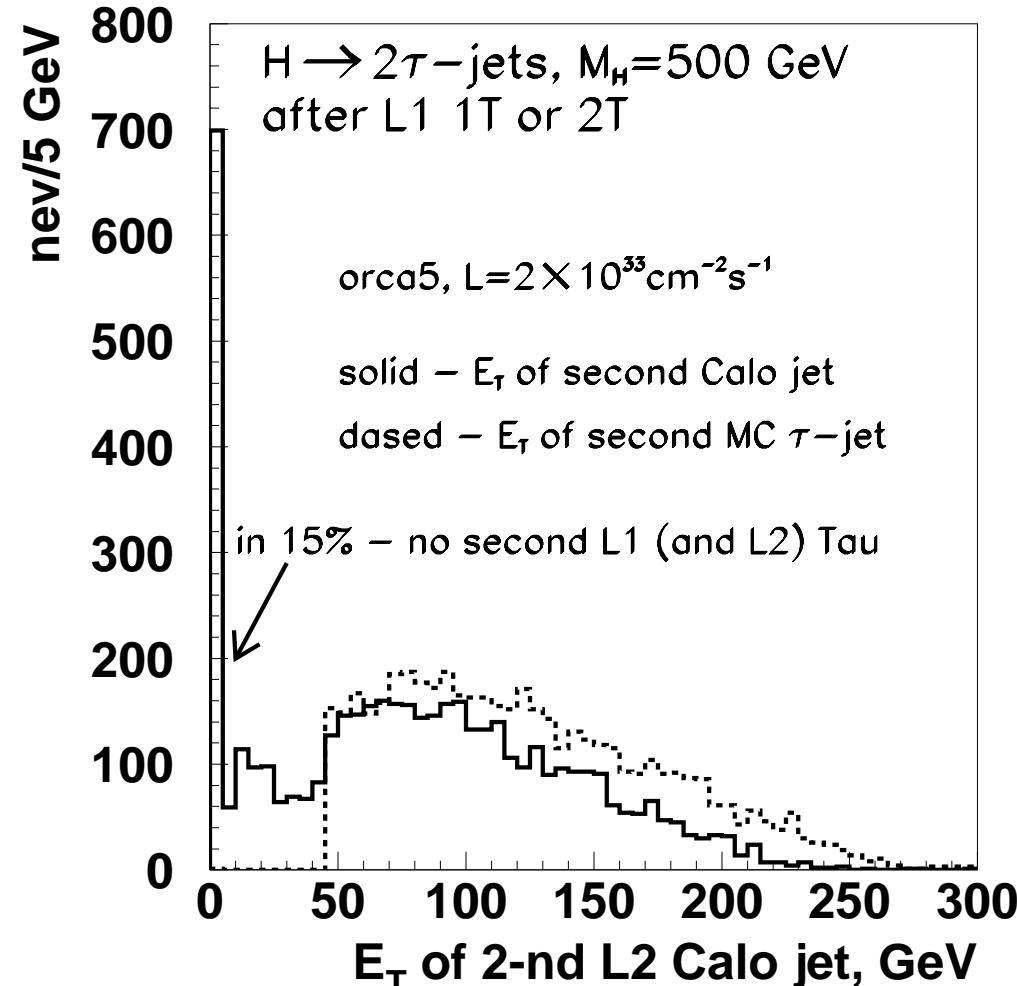
good matching !

matching of MC tau with
2-nd L1 Tau Jet



bad matching. it spoiles
efficiency at Lvl-2 Pxl
how to search for 2-nd tau ?

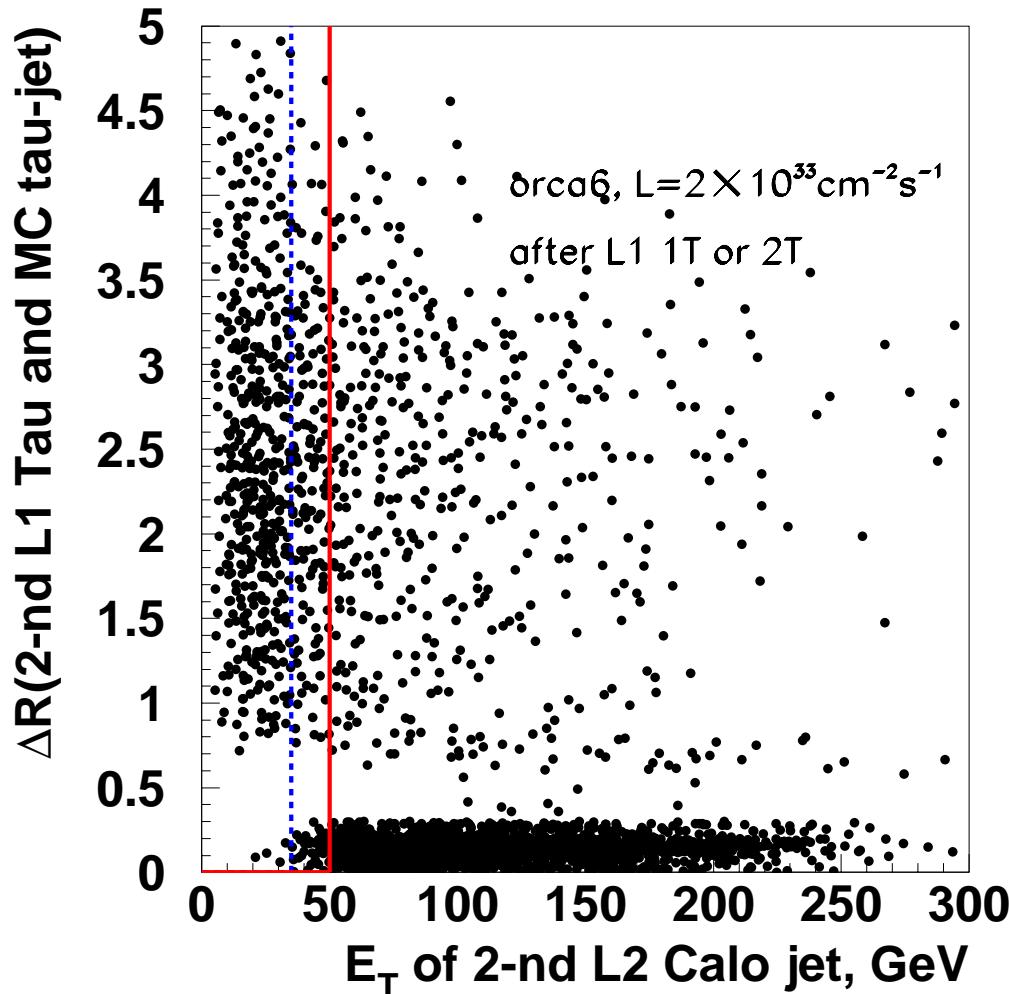
how it was solved with orca5



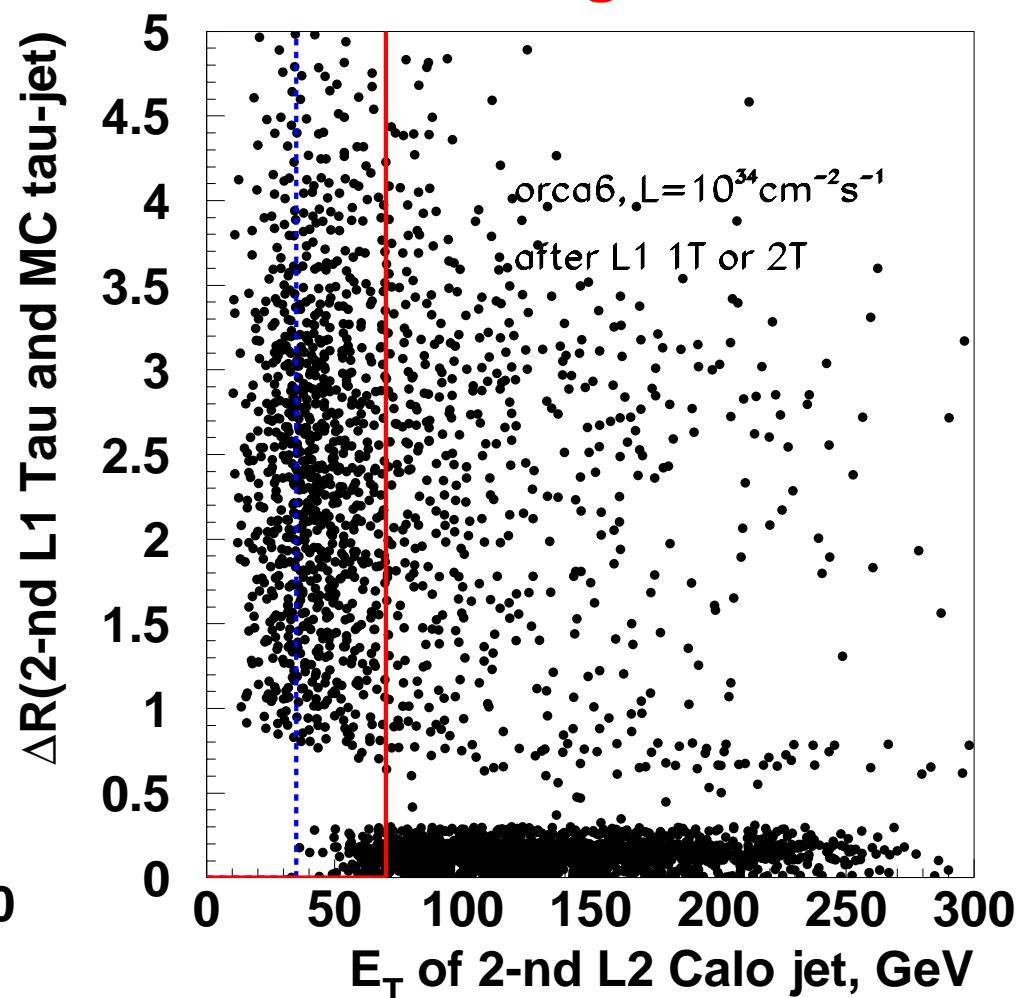
if E_T of 2-nd Lvl-2 Calo Jet is small or
jet doesn't exists take jet matched with
1-st L1 Central Jet. but - small in orca5 low lumi is not
“small” in orca6 high lumi
see next slides ...

E_T^{cut} on Lvl-2 Calo Jet should be changed from 35 GeV to ~ 70 GeV for orca6 high lumi.

orca6 low lumi.



orca6 high lumi.



jobs are running with new cutoff to check pixel id efficiency for second jet.

Search for two Lvl-2 Tau Jet candidates with L1 output in gg->bbH, H->2 τ -jet events passed Lvl-1 T or 2T trigger

search for Lvl-2 Tau jets with Lvl-1 output	ORCA5 $L=2 \times 10^{33} \text{cm}^{-2}\text{s}^{-1}$	ORCA6 $L=2 \times 10^{33} \text{cm}^{-2}\text{s}^{-1}$	ORCA6 $L=10^{34} \text{cm}^{-2}\text{s}^{-1}$
matching with 1-st Lvl-1 Tau Jet	0.98	0.98	0.98
no 2-nd Tau Jet in the Lvl-1 Tau jet list	0.15	0.16	0.07
matching with 2-nd Lvl-1 Tau Jet	0.78	0.74	0.65
matching with 2-nd Lvl-1 Tau Candidate	0.90	0.88 (0.89)*	0.75 (0.87)*

How to find Lvl-2 Tau jet candidates :

1-st L2 Tau Jet Candidate - L2 jet matched with 1-st L1 Tau Jet

2-nd L2 Tau jet candidate -

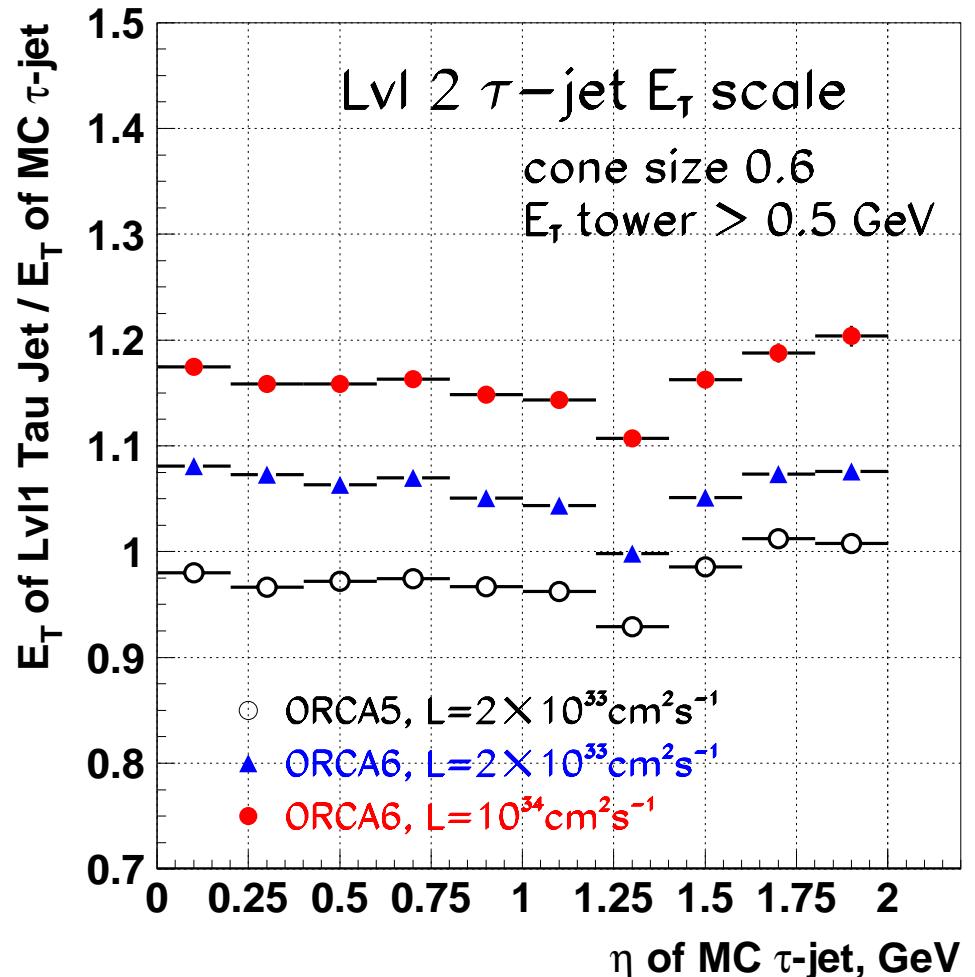
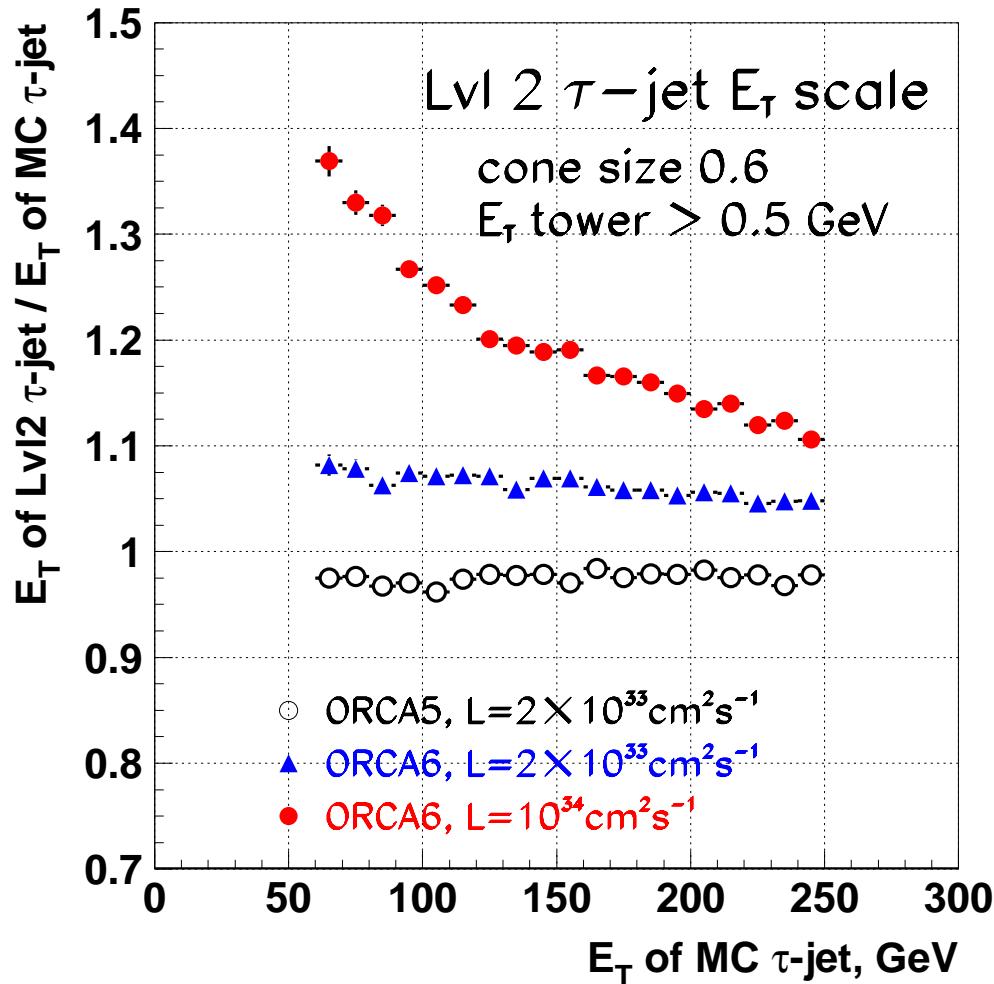
a) if E_T of 2-nd L2 Calo Jet > E_T^{cut} - take this jet

b) if E_T of 2-nd L2 Calo Jet < E_T^{cut} - take L2 jet matched with 1-st L1 Central Jet
 $E_T^{\text{cut}} = 35 \text{ GeV}$ used for orca5 and for orca6

definition of L2 Calo Jet : 1-st / 2-nd L2 Calo Jet is L2 jet matched with 1-st / 2-nd L1 Tau Jet

* $E_T^{\text{cut}} = 50 \text{ GeV}$ for ORCA6 low lumi, 70 GeV for ORCA6 high lumi.

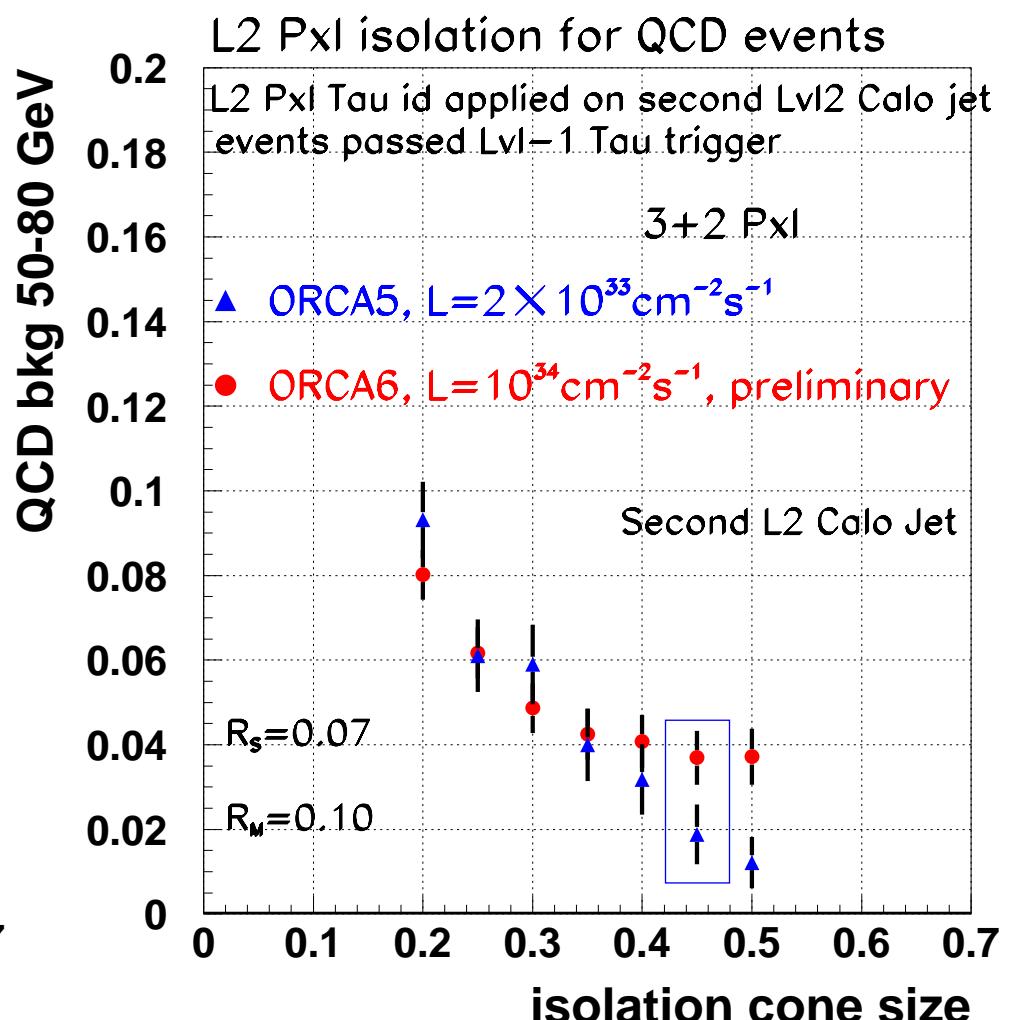
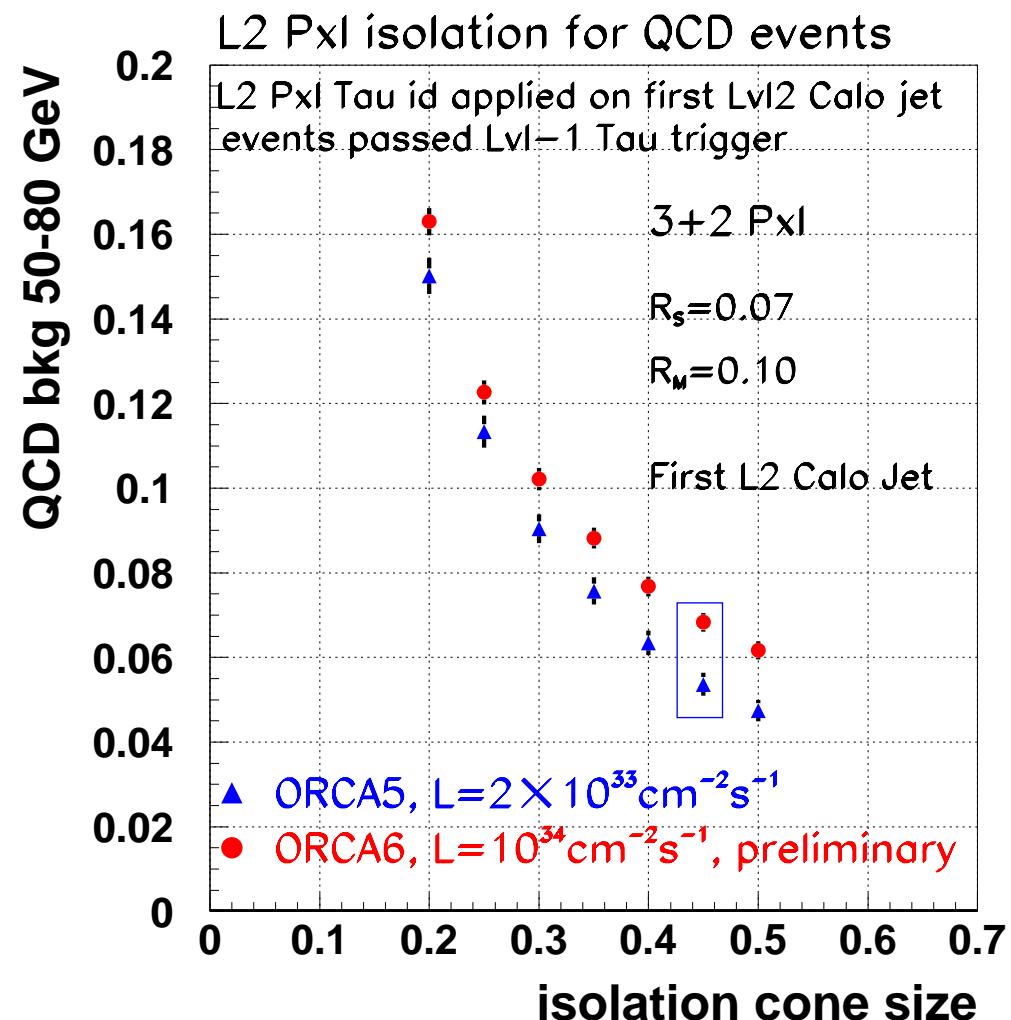
L2 Tau Jet scale vs $E_T^{\tau\text{-jet}}$ and $\eta^{\tau\text{-jet}}$



Big change on the scale at high lumi for soft jets !

Search for 2-nd Lvl-2 jet depends on this scale => depends on luminosity . . . Lvl-1 scale is less dependent on luminosity, may be apply E_T^{cut} at 2-nd Lvl-1 Tau Jet ? will try .

L2 Pxl Tau id isolation. QCD 50-80 GeV



degradation of the rejection for qcd background due to the same reasons as for the signal. Results for full HLT paths on H->2tau-jet : Calo+Pxl or Pxl only, will be soon.